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NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
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STATE OF NEVADA
Department of Conservation & Natural Resources
DIVISION OF ENVIRONMENTAL PROTECTION

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April 27, 2011

Irwin Kishner
Herman Kishner Trust
294 Convention Center Drive
Las Vegas, NV 89109

Maryland Square Shopping Center, LLC
c/o Tim Swickard
Dongell Lawrence Finney LLP
770 L St., Suite 950
Sacramento, CA 95814

Subject: **Draft Work Plan for Mitigation of Indoor Air and Well Water, Maryland Square Shopping Center**

Facility: Al Phillips the Cleaner (former)
3661 S. Maryland Parkway
Las Vegas, NV

Facility ID: H-000086

Dear Mr. Kishner and Mr. Swickard:

The Nevada Division of Environmental Protection (NDEP) has reviewed the ***draft Work Plan for Mitigation of Indoor Air and Well Water*** (Work Plan), prepared by Tetra Tech on behalf of the Herman Kishner Trust (Trust) and Maryland Square Shopping Center, LLC. (MSSC), and received electronically by the NDEP on February 28, 2011, and in hard copy on March 14, 2011. This letter and attachment provide the NDEP's comments on the draft Work Plan.

General Comments

The NDEP notes the following main issues with this draft Work Plan: (1) discerning between the interim-action level for tetrachloroethylene (PCE) in indoor air and the remediation standard for PCE in indoor air and (2) adhering to the four main tasks, as listed in Section III.A.1.a-d. of the Permanent Injunction (December 27, 2010).

1) As noted in the NDEP's letters of **January 11, 2011** and **February 3, 2011**, the interim-action level for PCE in residential indoor air is **not** the remediation standard for PCE in residential indoor air. The remediation standard has not yet been selected, but will consider 10^{-6} risk level as the point of departure.

2) The four main tasks described in Section III.A.1.a-d. of the Permanent Injunction include:

    a. Provide indoor air sampling for homes that overlie the area contained within the 100 micrograms per liter (µg/L) contour of the PCE plume in groundwater

b. Design, installing, and testing the efficacy of additional subslab depressurization (SSD) systems for additional homes if the indoor air sample contains concentrations of PCE that exceed the interim-action level for residential indoor air

c. Maintain and monitor existing (and any additional installed) SSD systems "*until Remediation Standards for PCE in groundwater and indoor air have been met.*"

d. Define the downgradient extent of the PCE plume in groundwater containing more than 5 µg/L of PCE, identify any domestic wells within this plume, and take appropriate action to assure that the drinking water standards for PCE and its degradation products are not exceeded.

For **Task 1.a,** the work plan describes an ambitious plan of vadose zone and subslab sampling, in addition to sampling indoor air. The NDEP notes that at this stage of project work, the task is not evaluating *if* vapor intrusion *could be* occurring at the site. The data collected to date clearly show that PCE vapors are intruding at significant concentrations (i.e., exceeding 10^{-4} risk) into some homes overlying the PCE plume in groundwater.

Although the NDEP does not disagree with the statement in Section 3.3.1 of the work plan that "*Sub-slab soil vapor samples are collected to evaluate target analyte concentrations in gases occupying the pore space of engineered base material or natural soils immediately beneath a building foundation,*" indoor air is the medium of concern. The intrusion of PCE vapors from the groundwater plume is not in doubt at this site.

The utility of subslab data is questionable for estimating indoor air concentrations; studies have shown extreme variability (orders of magnitude) across the slab. Additionally, empirical data show that attenuation factors also exhibit order-of-magnitude ranges. In contrast to estimating possible indoor air concentrations using an attenuation factor, a time-averaged sample of indoor air provides information on actual exposure.

Work should focus on the task of collecting indoor air samples. If a question of possible in-home sources arises, then additional work may be proposed as to how to evaluate such a situation.

Tasks 1.b and 1.c concern installation and maintenance of SSD systems; however, the work plan has incorrectly taken the interim-action level to be the remediation standard. Please keep in mind that the remediation standard for indoor air may be less than the 5 $\mu g/m^3$ detection limit of screening-level testing and Method TO-15.

Establishment of the remediation standard for indoor air would begin by considering as the point of departure, the 10^{-6} risk level, which currently corresponds to a concentration of 0.41 micrograms per cubic meter ($\mu g/m^3$) for PCE (U.S. Environmental Protection Agency [EPA], 2010) Analytical methods should be selected accordingly, so that detection limits are less than the possible remediation standard. Screening-level testing (5 $\mu g/m^3$ detection limit) of indoor air may be used to identify additional homes that need mitigation systems installed, but should not be used to "screen out" homes from further testing.

For **Task 1.d**, the work plan has altered the objective. The task is to define the downgradient extent of the PCE plume to the 5 µg/L concentration contour, because permitted domestic wells are (historically) installed in the area east of Eastern Avenue. Therefore, the work plan needs to propose locations east of the current wells, MW-30 and MW-31. With perhaps one exception, the lateral boundaries of the plume from the source area to the golf course are well defined or can reasonably be inferred based on data from existing wells.

Other observations on the draft Work Plan:

1. Incorrect or inappropriate technical terminology is used in the discussion of the geology and hydrogeology in Sections 1.3, which appears to be excerpted from problematic text in the Corrective Action Plan (CAP) for Groundwater. Specifically, the last paragraph in Section 1.3 needs to be reviewed and revised.

Specific Comments

Detailed specific comments are provided in Attachment 1 to this letter.

NDEP Requirements

Please provide responses to comments and the revised ***Work Plan for Mitigation of Indoor Air and Well Water*** by **June 13, 2011**. The revised Work Plan must include a schedule for implementation of resident notification and indoor air testing, and for drilling and installation of downgradient monitoring wells. If you have any questions or require additional information regarding this letter, contact me by telephone at (775) 687-9496 or e-mail at msiders@ndep.nv.gov.

Sincerely,

Mary A. Siders, Ph.D.
Bureau of Corrective Actions
Fax (775) 687-8335

Enclosures (1)

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ATTACHMENT 1 – SPECIFIC COMMENTS

Draft Work Plan for Mitigation of Indoor Air and Well Water, Maryland Square Shopping Center, Facility ID: H-000086

PART A: REQUIRED CRITICAL COMMENTS

Section 1, Introduction

1. Page 1-1, first paragraph and Figure 1-1. The figure shows the **3rd quarter 2010 plume** (October, 2010 samples). **Please replace with the 4th quarter 2010 plume** figure (November 2010 samples). Also, NDEP is the Nevada **Division** of Environmental Protection.

2. Page 1-1, second paragraph. Text states that "*Characterization of the site includes defining the extent of the groundwater PCE plume and assessing PCE in indoor air and soil vapor.*" The NDEP did not specifically request characterization of the soil vapor, and indeed, this would be a large and difficult task, were the lithologic heterogeneity and preferential pathways (utility corridors, etc) to be characterized across the entire site. Collecting vapor data over time by installing vapor monitoring wells should provide information on the temporal variability in tetrachloroethylene (PCE) vapor concentrations; however, the work plan should focus on the key tasks (indoor air testing, installation/maintenance of subslab depressurization (SSD) systems, and delineation of the downgradient extent of the PCE plume in groundwater to 5 micrograms per liter [µg/L]).

3. The tasks and objectives listed in the work plan included the following:

   1. [d]Define the extent of the PCE groundwater plume.

   2. [a]Provide a plan for indoor air sampling for homes within the Site that overlie groundwater containing PCE at a concentration of 100 µg/L or more.

   3. [b]Provide a plan to design, install, and test the efficacy of additional subslab depressurization (SSD) systems if indoor air samples collected from unmitigated homes are found to contain PCE vapors at concentrations exceeding NDEP's interim-action level of 32 µg/m^3, subject to homeowner approval.

   4. [c]Provide a plan to maintain and monitor existing SSD systems ***until they are no longer necessary to protect human health****.*

   5. [d]Identify any domestic wells within the 5 µg/L boundary of the plume and describe appropriate actions

   The NDEP notes that items 1 and 5 above relate to the single item **III.A.1.d**. in the Permanent Injunction (December 27, 2010); however, the draft Work Plan has created two parts to this item, and thereby failed to meet the objectives as stated in the Injunction. The Injunction required that the downgradient extent of the plume be defined to the 5 µg/L concentration contour. The northern and southern boundaries of the plume are adequately defined, with the possible exception of the 100 µg/L contour across Mariposa Way. The NDEP required defining the downgradient extent of the plume because there are known permitted domestic wells downgradient (i.e., east of Eastern Avenue), with the possibility that some of these wells are still in use. Houses within the residential neighborhood

(i.e., the golf course subdivision) are all likely served by the municipal water supply, but this should be verified.

Therefore, tasks 1 and 5 need to be recombined to state the single task to "Define the downgradient extent of the groundwater plume containing more than 5 µg/L, and identify any domestic wells within the downgradient extent of this plume (see Injunction **Section III.A.1.a-d**)

4. Page 1-2, second paragraph. Text states "*However, the distal and lateral extents of the PCE plume have not been determined to a concentration of 5 g/L.*"

   The Injunction required delineation of the downgradient extent of the PCE plume. The NDEP also notes that wells with nondetect to low concentrations already constrain the lateral boundaries of the plume between the source area and the western side of the golf course. Therefore, the northern and southern boundaries of the PCE are sufficiently well-delineated, with perhaps the possible exception of the 100 µg/L contour across Mariposa Way, where the plume widens. This widening is potentially the result of interaction with changes in the groundwater flow gradient due to infiltration resulting from irrigation of the golf course.

5. Page 1-2, fourth paragraph. Text states that "*In response, NDEP sampled indoor air in 97 homes and two schools between fall 2007 and winter 2007-2008.*" More specifically, the NDEP collected indoor air samples in two phases, from **September 2007 to March 2008**. Also, these indoor air data have been kept confidential to assure the privacy of the homeowners.

6. Page 1-3, second paragraph. Text states that "*Lithologic data are available in **borehole logs from 33 monitoring wells** installed at the Site during 2000 to 2008.* Lithologic data are also available for 16 borings installed for the soil gas study (URS, 2007a) and 29 borings in the source area (URS, 2007b). Additionally, boring BT-2 was installed between MW-32 and MW-33 to determine well placement (URS, March 2008 report). Driller's logs for the golf course irrigation wells are older (1961 and 1977) and lack specific detail.

Section 2, Delineation of the Groundwater Plume

7. Page 2-1, first paragraph. Text states that "*the locations of these wells and the defined extent of the PCE plume as represented by the 3rd quarter 2010 data are shown on Figure 2-1.*"

   Please use **4th quarter 2010** data; the 3rd quarter data show an anomaly at MW-26, which perturbs the 500 µg/L contour. The average concentration of PCE in MW-26 (calculated using all data through 4th quarter 2010) is 830 µg/L.

8. Page 2-1, first paragraph. Text states that "*Eight additional wells are proposed to define the lateral extent of the PCE plume to a concentration of 5 g/L. The proposed locations for the new wells are shown on Figure 2-1.*"

   Figure 2-1. The NDEP notes that **Task III.A.1.d**. of the Permanent Injunction specifically requested that the 5 µg/L boundary at the downgradient extent of the plume be defined. After defining the leading

edge of the plume, the next step was to evaluate whether any domestic wells (mainly east of Eastern) could be affected by the plume at its downgradient (i.e., east of Eastern Ave) extent. Homes west of Eastern Avenue and around the golf course are part of a subdivision that is likely supplied by the municipal water supply; however, this should be verified by review of Nevada Division of Water Resources (NDWR) data.

Therefore, the NDEP notes the following regarding the proposed well locations that are shown on Figure 2-1 of the work plan:

a) The well between MW-21 and MW-22 does not contribute to achieving the objective of delineating the downgradient extent of the plume. Moreover, data for the past two years show that concentrations of PCE in MW-21 have ranged from 11 to 20 µg/L and have been nondetectable in MW-22. The 5 µg/L contour can be quite reasonably inferred here.

b) The proposed well east of MW-24 mid-way down Ottawa St does not contribute to achieving the objective of delineating the downgradient extent of the plume. Again, nondetections in MW-24 and MW-28 allow reasonable inference of the 5 µg/L boundary along the south side of the plume in this area.

c) The proposed well on the corner of Spencer St and Ottawa does not contribute to achieving the objective of delineating the downgradient extent of the plume. Nondetections in well MW-28 allow reasonable inference of the 5 µg/L boundary.

d) Include on this figure, the location of **boring BT-2**, from which a grab sample of groundwater contained 130 µg/L PCE (URS 2008). (This boring was located about 300 ft south of MW-33).

e) After including boring BT-2 on the figure, consider whether the proposed wells on Cherokee or the location on Mariposa, are both needed. MW-22 and MW-33 constrain the northern boundary of the plume, and the grab sample from BT-2 provides additional data to assist in inferring the 100 µg/L boundary.

f) As noted in the NDEP's letters of January 11 and February 3, 2011, the **golf course irrigation well, PW-1, is incorrectly located on Figure 2-1**. Please see Figure 2 in the URS report dated March 24, 2008, for the correct location of this irrigation well.

g) The proposed well located about 600 feet east of well MW-30 should be drilled and sampled first in the well installation program. If PCE is detected at a concentration greater than 5 µg/L at this location, another well should be drilled farther east, and so on. **Consider and propose the sequence in which the wells will be drilled, and use grab samples and rapid turn-around analysis to "adjust" placement of the next wells to be installed.**

h) The effect of infiltration of the irrigation water on the depth and lateral spread of the plume along Spencer St is currently unknown, but the seasonal fluctuation in the water table can be clearly seen in the water level data for wells near the golf course (MW-26, MW-27, MW-30, etc). It may be worthwhile to deploy passive diffusion bags (PDBs) or other means in wells MW-27, MW-30, MW-31, and MW-32 (and in other site wells) to better understand the **vertical distribution of PCE** within each well and assist in selecting appropriate screen depths for the proposed new wells.

i) Finally, please note that water tends to "rebound" in wells installed in the Las Vegas. Not recognizing this may lead to installing a well with a screen that becomes submerged (e.g., well MW-30)

Installation of additional wells as proposed (see a, b, c above) that are not required to meet the objective of downgradient delineation should be carefully considered. Each well installed will be included in the ongoing monitoring program.

9. Page 2-1, Section 2.1. The Work Notices should be submitted for NDEP review and approval. In addition to a number for NDEP, the Work Notices should include a number for a representative of the Herman Kishner Trust (Trust) responsible for overseeing field work.

10. Pages 2-1 to 2-2, Section 2.2. Propose how screen depth and length be determined for each well and provide the rationale. Note item (i) in Comment 10 above.

11. Page 2-3, Section 2.4. Text states that "*One duplicate sample and one trip blank sample will be collected for quality assurance (QA)/quality control (QC).*" Does this mean one per well or one per day? How will data from the duplicate sample be used? Will the highest numbers be posted or will an average be posted or will both values be posted?

12. Page 2-3, last paragraph. The monitoring frequency for the new wells will be determined by the NDEP after two quarters of data have been collected.

13. Page 2-3, Section 2.5. The proposed schedule for completing report of field work and additional investigation work plans should be provided, and should be a certain number of days following completion of field work.

Section 3, Indoor Air and Soil Vapor Sampling Plan

14. Page 3-1, first paragraph states that "*In addition to indoor air sampling, soil vapor sampling, including sub-slab sampling beneath homes and vadose zone sampling in the affected neighborhood, is recommended to assess the VI pathway.*"

NDEP does not agree that collection of soil gas data is necessary to achieve the four goals of the work, as specified in Section III.A.1.a-d of the Permanent Injunction. The NDEP notes that, at this stage of site work, the task is not evaluating ***if*** vapor intrusion could be occurring at the site. The data collected to date clearly show that PCE vapors are intruding at significant concentrations (i.e., exceeding 10^{-4} risk) into some homes overlying the PCE plume in groundwater. Because the spatial heterogeneity of subslab and vadose-zone gas samples typically far exceeds the temporal variability of indoor air samples, NDEP does not agree that results of subslab and soil vapor sampling are necessary to achieve the goal of this work.

Revise this plan to reflect and implement actions necessary to achieve objectives of the corrective action plan (CAP) for groundwater. Although the objective of this plan is to assess concentrations exceeding 32 micrograms per cubic meter ($\mu g/m^3$) in residential indoor air, there are additional

objectives for the groundwater CAP that can be met as part of this work plan. The additional objective for CAP is to determine whether indoor air concentrations exceed the indoor air concentration of PCE anticipated to result in exceedance of the remediation standard, using 1 x 10^{-6} cancer risk as the point of departure. This value is currently 0.41 µg/m^3, per USEPA's November 2010 RSL value for PCE in residential indoor air (USEPA, 2010).

For purposes of completing the CAP and report for groundwater, including this additional objective eliminates the need for a multi-step approach. Collecting indoor air data that provides adequate sensitivity to meet any remediation standard, from 0.41 µg/m^3 upward, will ensure that these data can be used to confirm when and where the remediation standard for indoor air is achieved.

15. Page 3-1, second paragraph proposes a "*multi-step approach to the indoor air sampling program,*" which proposes (1) identifying homes within the 100 µg/L boundary for PCE in groundwater, (2) collecting grab indoor air samples and performing analysis on site, and (3) collecting 24-hour integrated samples of indoor air using a 6-liter summa canister.

    (1) The NDEP notes that the 100 µg/L boundary should be drawn to err on side of protectiveness and include more, rather than fewer, homes in the indoor air sampling program. For purposes of the indoor air sampling program, the boundary should not be used to exclude homes from sampling that are between a well with PCE concentrations greater than 100 µg/L and a well with PCE concentrations less than 100 µg/L.

    (2) In proposing step 2, the work plan states that on-site analysis will be used as a "*a cost effective way to quickly eliminate from the program homes for which there is no evidence of significant impacts to indoor air*" and continues "*The screening level sampling will be followed up with collection of 24-hour time-composite SUMMA canister samples in homes that are not screened out during the initial sampling. Data from the SUMMA canister sampling will be used to develop a list of homes that have indoor air PCE concentrations above the NDEP Interim Action Level of 32 µg/m3 and should be included in the long-term indoor air monitoring program (LTIAM).*"

    The on-site analysis will be useful for quickly identifying homes that may need a mitigation system; however, homes should not be "screened out" from long-term monitoring if PCE is not detected by the screening-level analysis. Homes within the 100 µg/L area of the plume should be sampled at least once, using an analytical method that meets the remediation standard for PCE in indoor air, before the groundwater remedy commences.

    (3) The NDEP notes that the 24-hour sample collected in a 6L summa canister is consistent with the sampling done by the NDEP in 2007-2008. However, depending on the remediation standard for PCE in indoor air, analytical method TO-15 SIM may be required to achieve sufficiently low detection rates.

16. Page 3-1, second paragraph. Text states that "*A flow chart of the decision process for inclusion/exclusion of homes in the LTIAM is provided in Figure 3-1 (note that* ***the decision process illustrated in Figure 3-1 is valid only until the remediation standard for groundwater has been satisfied)***"

The above statement is incorrect: the remediation standard for indoor air must be achieved, ***as well as*** the remediation standard for groundwater (see Section III.A.1.c, of the Permanent Injunction).

17. Figure 3-1. A step in the left-hand side of this flow chart indicates that if the indoor air screening results are less than 16 µg/m^3, the process will "*Dismiss home from IA sampling program.*"

    Please note that there is nothing in the Injunction that indicates homes within the 100 µg/L contour should be "dismissed" from the annual indoor air monitoring program. Homes within this area should be resampled at least annually until remediation standards are attained for groundwater ***and*** indoor air. Eliminating this element regarding "dismissal" from the flow chart also eliminates the question "*Have GW concentrations increased by >50%?*"

18. Figure 3-1. A step in the right-hand side of this flow chart asks "*Is IA PCE concentration below 32 µg/m3?*" and leads to a decision to "*Turn off SSD system, resample indoor air*"

    Revise this plan to reflect and implement actions necessary to achieve objectives of groundwater CAP. Although the objective of this plan is to assess concentrations exceeding 32 µg/m^3,in residential indoor air, there are additional objectives for the CAP that can be met as part of this work plan. The additional objective for groundwater CAP is to determine whether indoor air concentrations exceed the indoor air concentration of PCE anticipated to result in exceedance of 1 x 10^{-6} cancer risk. This value is currently 0.41 µg/m^3, per EPA's November 2010 RSL value for PCE in residential indoor air.

    For purposes of completing the CAP and report for groundwater, including this additional objective eliminates the need for a multi-step approach. Collecting indoor air data that provides adequate sensitivity to meet any remediation standard, from 0.41 µg/m^3 upward, will ensure that these data can be used to confirm when and where the remediation standard for indoor air is achieved.

    Please modify the flow chart accordingly. The SSD systems should continue to run until the remediation standards for indoor air *and* groundwater have been attained.

19. Page 3-1, fourth paragraph. "*Homes within the 100 µg/L PCE isoconcentration contour will be sampled for elevated indoor air concentrations; however, because this contour is not yet fully delineated, the number and location of homes that will be recommended for sampling is to be determined.*"

    The permanent injunction (December 27, 2010) ***requires*** indoor air sampling, at least annually, for homes within the 100 µg/L PCE contour for groundwater; however, this does not ***exclude*** sampling of homes outside this boundary (see **Sections IV.A.2. and IV.A.4** of the Permanent Injunction, 2010). The NDEP may request sampling of homes outside of this contour, based on other data collected (e.g., indoor air data of adjacent or nearby homes, etc.). Also, the science and sampling methods continue to evolve. Depending on the new toxicity values for PCE (and TCE) to be published by the USEPA in 2011 or 2012, the **interim-action level** and the **remediation standard** may be modified accordingly.

    NDEP requests that the analytical method will be modified from TO-15 to TO-15 SIM as part of meeting objectives of the groundwater CAP. One of these objectives is to determine the **remediation standard**

for PCE in indoor air. The remediation standard has not yet been selected, but is likely to be initially specified with a 10^{-6} goal, which may be modified to a 10^{-5} level. NDEP requests that the indoor air monitoring employ an analytical method with a lower detection limit, as part of developing the **remediation standard** under the CAP.

There have been advances in quantitative passive samplers (McAlary 2010; Schumacher et al, 2011) and the NDEP does not rule out the use of these quantitative passive samplers as part of the long term indoor air monitoring program.

20. Page 3-1, last paragraph states: "*Once the 100 µg/L PCE isoconcentration contour has been fully delineated, plume contours will be overlaid onto a map of residential property lots within the Site. Those homes located on lots that are within the 100 µg/L contour will be recommended for inclusion in the indoor air sampling program.*"

    The NDEP notes that, because such contours cannot be "fully delineated" and must be inferred in part, the 100 µg/L boundary should be drawn to err on side of protectiveness and include more, rather than fewer, homes in the indoor air sampling program (i.e., if the 100 µg/L contour cuts a corner of the lot; include the home in the sampling program). Most of the wells proposed for the area west of the golf course (see Figure 2-1) are not needed to reasonably infer plume boundaries at the 5 and 100 µg/L contours in the area west of the golf course.

21. Page 3-2, first paragraph states that "*Correspondence requesting permission to conduct indoor air sampling will be issued to those homes and homeowners recommended for inclusion in the initial sampling program. A release of liability form will be included in notification correspondence to be completed for purposes of documenting authorization to conduct subsequent indoor air sampling activities. It is assumed that* ***notification and request efforts will be conducted in collaboration with NDEP*** *and in conjunction with the Community Relations Plan.*"

    The NDEP will be the point of contact with the homeowners, and all correspondence to the homeowners will come through the NDEP. Details of the sampling teams need to be worked out, but will include an NDEP representative (either NDEP staff or staff from NDEP's contractor, Broadbent & Associates, Inc. (BAI), who participated in all the indoor sampling done to date). All homeowners who do not respond to the initial notification will be contacted a second time. The plan should be revised to reflect these changes.

22. Page 3-2, paragraph 5 states that "*Indoor air sampling can be regarded as a nuisance or disturbance to homeowners or occupants. Consequently, judicious efforts to thoughtfully coordinate with owners/occupants to conduct home surveys and gain access to indoor areas for sampling events will be needed. In an effort to impart credibility regarding the importance of this activity and to relieve potential concerns, NDEP participation with Tetra Tech while engaging sampling program participants is invited.*"

    Correspondence and contact with homeowners (and government officials) will occur through the NDEP. As noted under comment 21, details of the sampling teams need to be worked out, but will

include an NDEP representative (either NDEP staff or staff from NDEP's contractor, BAI, who participated in all the indoor sampling done to date). The plan should be revised to reflect these changes.

23. Page 3-3, fourth complete paragraph notes that "*Because the modified Method 8021 instrumentation completes sample quantification within 5 minutes, multiple samples from each home can be collected and analyzed to complete a robust VI profile of subject residences. This screening program will also enable the detection of indoor sources of target analytes. It is anticipated that two to five grab samples will be collected from each home depending upon house size and layout.*"

    How do results from the real-time analysis of multiple samples from a single home, compare with analytical results from a summa canister? The samples analyzed in the mobile laboratory have the advantage of expediency, but are even more temporally challenged than a 24-hour time-integrated sample collected in a summa canister. Please provide a reference for the "supporting data compiled by EPA." Will the TAGA mobile laboratory be used? Can data generated using the mobile laboratory be validated at any level?

    The screening-level reporting level of 5 $\mu g/m^3$ for PCE is approximately equal to the average reporting limit achieved using summa canisters during the NDEP's 2007-2008 sampling campaign, and will be sufficient for screening to install and monitor SSD systems. However, depending on the remediation standard selected for PCE in indoor air, a lower reporting limit may be needed to verify that the remediation standard has been achieved.

24. Page 3-3, last paragraph states that "*A PCE screening level concentration of 16 $\mu g/m^3$ is recommended as the threshold to determine subsequent action. This concentration is equal to 50 percent of the NDEP Interim Action Level and provides a margin of error to account for potential temporal variability in indoor air concentrations. Supporting data compiled by EPA using the trace atmospheric gas analyzer (TAGA) mobile laboratory has demonstrated that grab samples tend to match 24-hour time-composite samples by less than a factor of two; therefore, the proposed screening level concentration of 16 $\mu g/m^3$ is consistent with this research and provides an adequate safety factor.*"

    The NDEP requests that references be provided to document this paragraph, specifically the USEPA data using the TAGA mobile laboratory. Is this the mobile laboratory proposed for the work at the Maryland Square PCE Site?

25. Page 3-4, first paragraph states that "*Homes where breathing air samples do not exceed 16 $\mu g/m^3$ will be dismissed from the indoor air sampling program (Figure 3-1).*"

    The NDEP notes that the purpose of the air sampling is not only to trigger installation of SSD systems at 32 $\mu g/m^3$, but to assure that PCE concentrations decline to the **remediation standard** over the course of groundwater remediation. This will need to be addressed in the indoor air sampling, so consider how the selection of a remediation standard will affect the analytical methods used in the LTIAM program. For example, if the remediation standard is 3.2 ug/m^3, then method TO-15 SIM would be needed instead of method TO-15.

The NDEP does not concur with dismissing any home from the indoor air sampling program at this time. Homes within the 100 µg/L contour of the PCE plume in groundwater must be sampled at least annually for indoor air.

26. Page 3-5, third paragraph states that *"Homes that do not have PCE concentrations in breathing air above 32 µg/m^3 will be dismissed from the indoor air sampling program."*

See NDEP comments above. Homes must be monitored until the remediation standards for both groundwater and indoor air are attained.

27. Page 3-5, fourth paragraph. *"Homes that are determined during the Phase II sampling to have indoor air PCE concentrations above 32 µg/m^3 and homes within the 100 µg/L PCE groundwater contour that have existing SSD systems will be included in the LTIAM program (Figure 3-1). Sampling for the LTIAM program will be conducted on an annual basis."*

28. Page 3-5, last full paragraph. *"For homes where PCE concentrations in indoor air have been mitigated below 32 µg/m^3, the groundwater concentrations in the vicinity of the homes, as determined from the groundwater LTM program, will be used to guide the decision steps. If groundwater concentrations in the vicinity of the home fall below 100 µg/L (i.e., the home is no longer within the 100 µg/L isoconcentration contour), then the home will no longer meet the criterion for indoor air sampling and it will be dismissed from the LTIAM program and the SSD system will be disabled."*

The NDEP does not concur with the proposal to use the 100 µg/L criterion to eliminate homes from mitigation and monitoring. Those homes with a SSD system will continue to be sampled annually until remediation standards for both groundwater and indoor air are attained.

Any shutdown of any SSD system must be followed by indoor air monitoring to assure that the remediation standard for indoor air has been met

29. Page 3-6, first full paragraph. *"Sub-slab soil vapor samples are collected to evaluate target analyte concentrations in gases occupying the pore space of engineered base material or natural soils immediately beneath a building foundation. Collection of **sub-slab soil vapor samples** can be useful in determining whether target analytes detected in indoor air are attributable to VI or not. Due to the multiple potential sources of target analytes in a home, the presence of target analytes in indoor air does not necessarily indicate that VI is occurring.*

There is no compelling need to evaluate ***if*** homes in the neighborhood are affected by vapor intrusion; the key question to satisfy the objectives prescribed in the Injunction is, how many homes are affected and to what extent? To answer this, indoor air data are needed. Testing (and resources) should focus on evaluating indoor air. If data suggest that in-home background sources are contributing to the concentrations of VOCs in indoor air, then additional testing (such as subslab sampling) may be recommended.

At this site, homes with PCE concentrations in indoor air that exceeded the mitigation standard exhibited a spatial association. Likewise, homes where PCE was not detected in indoor air also exhibited a spatial association. This spatial distribution of results for the indoor air samples collected in 2007 – 2008 provides additional support to the determination that elevated concentrations of PCE within the homes are the result of vapor intrusion related to the underlying PCE plume in groundwater.

The NDEP notes that discerning background contributions from vapor intrusion may become more difficult as the screening level or remediation standard is set below typical background values. A study by the Massachusetts Department of Environmental Protection (MassDEP)(2008) determined that 4.1 $\mu g/m^3$ PCE was the 90th percentile of background for PCE in residential indoor air. The NDEP addressed the issue of background sources within the home during the previous phases of indoor air sampling by conducting an in-home survey, having in-home meetings and discussions with the homeowner, and performing screening with a part-per-billion (ppb) photoionization detector (PID).

The NDEP also notes that concentration of gases in the subslab environment tends to be highly spatially heterogeneous and may range by three orders of magnitude across the slab, even for a small residence (McAlary, 2010). In contrast, indoor air is fairly well-mixed. Although temporal variation is possible, the amount of this variability under climatic conditions in Las Vegas may likely be less than the temporal/seasonal variability seen for vapor intrusion sites in the northern US, where concentrations are greatest during the winter season (effects of furnaces operating, snow on ground, soil moisture high, etc.).

Detailed studies have also shown that houses "breathe," and air from sources in the house can actually migrate into and contaminate the subslab environment (Johnson et al 2011). Johnson et al bought a house near the edge of a solvent plume, then collected indoor and subslab samples, and used SF6 as a tracer gas. SF6 was detected in subslab samples from 0 to >700 parts per billion by volume (ppbv).

The NDEP considered collecting subslab samples at the Maryland Square PCE Site, but decided against doing so because (1) it is even more intrusive to be drilling through a resident's floor than setting up a summa canister in a living room; (2) data from other studies showed extreme spatial heterogeneity in subslab vapors (i.e., at least several samples collected across the slab would be required to even begin to characterize the subsurface); (3) NDEP conducted in-home surveys and discussed sampling and the issue of background sources, and provided instructions to homeowners; and (4) upon evaluating the indoor air data collected in 2007, the spatial distribution of results showed that the homes containing high concentrations of PCE vapors (i.e., > 32 µg/m3)were grouped together in one area.

30. Page 3-6, penultimate paragraph. *"An **additional objective** will be to collect sub-slab samples from homes located over the silty soils generally found between MW-23 and MW-25 and homes located over the gravelly sands found east of MW-25 and in the vicinity of MW-18 (URS 2007)."*

This "additional objective" is not one of the tasks listed in **Section III.A.1** of the Permanent Injunction, and the NDEP does not consider that this proposed subslab sampling would contribute to fulfilling the tasks listed in the Injunction. The NDEP notes that the grading and building pads for the homes, along with short-range heterogeneity of the alluvial deposits and building-specific factors, will likely confound any attempt to correlate vapor concentrations with soil type based on lithologic descriptions

for monitoring wells and borings that are tens or hundreds of feet distant. If background sources in the home are suspected, then subslab sampling could be considered.

31. Page 3-7, fourth complete paragraph states that vadose-zone samples *"are important in characterizing the site as they provide data on vapor concentrations immediately above the groundwater source and on the rate of vertical attenuation. Like sub-slab samples, they* ***can be*** *useful in* ***assessing whether*** *chemicals detected in indoor air are a result of VI."*

    The NDEP does not disagree that vadose-zone gas samples ***can*** provide "data on the rate of vertical attenuation;" however, there is no compelling need to evaluate ***if*** homes in the neighborhood are affected by vapor intrusion; the question is, how many homes are affected and to what extent? To answer this, indoor air data are needed. Testing (and resources) should focus on evaluating indoor air. If data suggest that background sources are contributing to the observed concentrations in indoor air, then additional testing (such as subslab sampling) may be recommended.

32. Page 3-8, first complete sentence states *"Recent groundwater elevation data (Tetra Tech 2010) indicate groundwater depths along the plume transect ranging from approximately 13 feet bgs (MW-18) to 21 feet bgs (MW-25); thus, the deep probes will be installed at depths of approximately 10 to 18 feet bgs."*

    Please note that groundwater at MW-18 has been measured as shallow as 8.7 feet below ground surface (bgs) (May 2005 water-level measurement), so please plan accordingly.

Section 4. Monitoring Sub-slab Depressurization Systems

33. Page 4-1, first paragraph states that *"If indoor air PCE concentrations at a home are found to exceed 32 $\mu g/m^3$, the SSD system will be evaluated and optimized as necessary to bring the indoor air concentrations into compliance. If an SSD system is adjusted due to the detection of elevated PCE concentrations, indoor air in the home will be resampled after 1 month of making the adjustments to verify that it is back in compliance with Interim Action Level."*

    The NDEP concurs with the Trust maintaining the efficacy of SSD systems, as described in Section 4. The Trust should propose individuals who will be available to answer homeowner's questions and inspect systems as requested by homeowners to the NDEP.

Section 5. Identification and Sampling of Domestic Wells

34. Page 5-1, first paragraph *"A survey will be conducted to identify all domestic wells located within the 5 g/L PCE plume. The extent of the area for the evaluation will be finalized after completion of the investigation presented in Section 2.0. Homes within 100 feet of the delineated extent of the 5 g/L plume area will be included in the evaluation. Based on the results of the 2010 groundwater monitoring events, this survey may include 120 to 130 homes."*

    There seems to be a misunderstanding of this task. The NDEP notes that Task III.A.1.d. of the Permanent Injunction specifically requests defining the *downgradient* extent of the plume at the 5 µg/L boundary. This task was intended to define the leading edge of the plume and to determine if any

domestic wells (mainly in the area east of Eastern Ave) could be affected at the <u>downgradient extent</u> of the PCE plume. Homes <u>west</u> of Eastern Ave and around the golf course are part of a subdivision that is likely supplied by the municipal water supply; however, this should be verified by researching the NDWR files.

35. <u>Page 5-1, second paragraph</u> *"Letters will then be sent to each address within the area of concern to request information on any water wells on the property and requesting information on well construction and usage. It is assumed that NDEP and a legal representative of the homeowners will support Tetra Tech in developing and distributing the information request letters, and that the letters will be printed on NDEP letterhead."*

A search of the DWR database, with detailed cross-checking, is anticipated to result in only a handful of domestic wells in the area. Field checks of these wells may be required.

Figure 1. The APNs shown in the following sketch cover the area east of Spencer St and **east of Eastern Ave.**

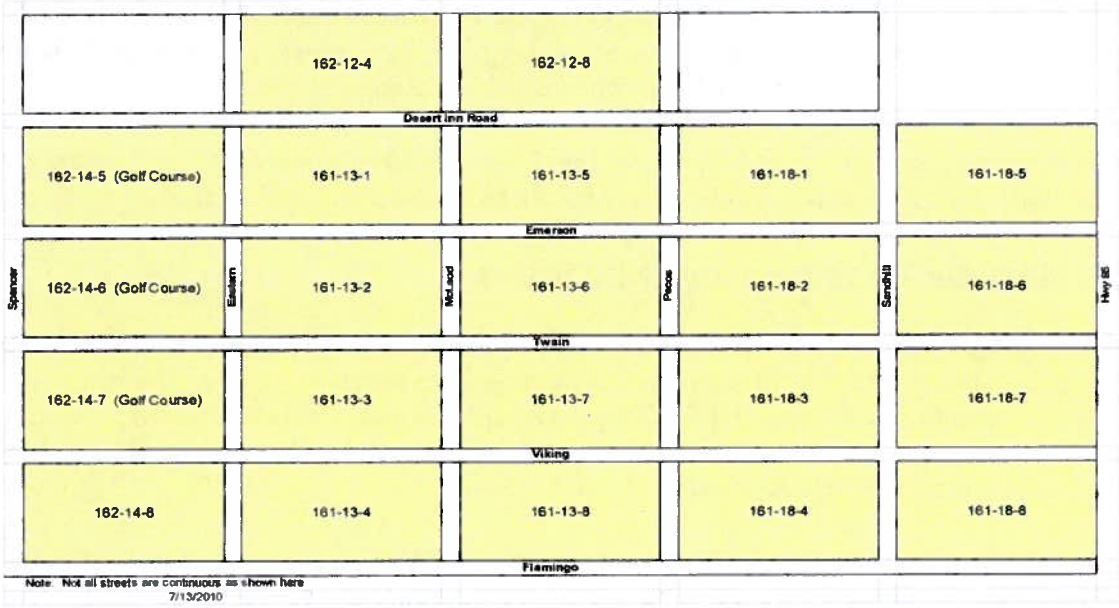
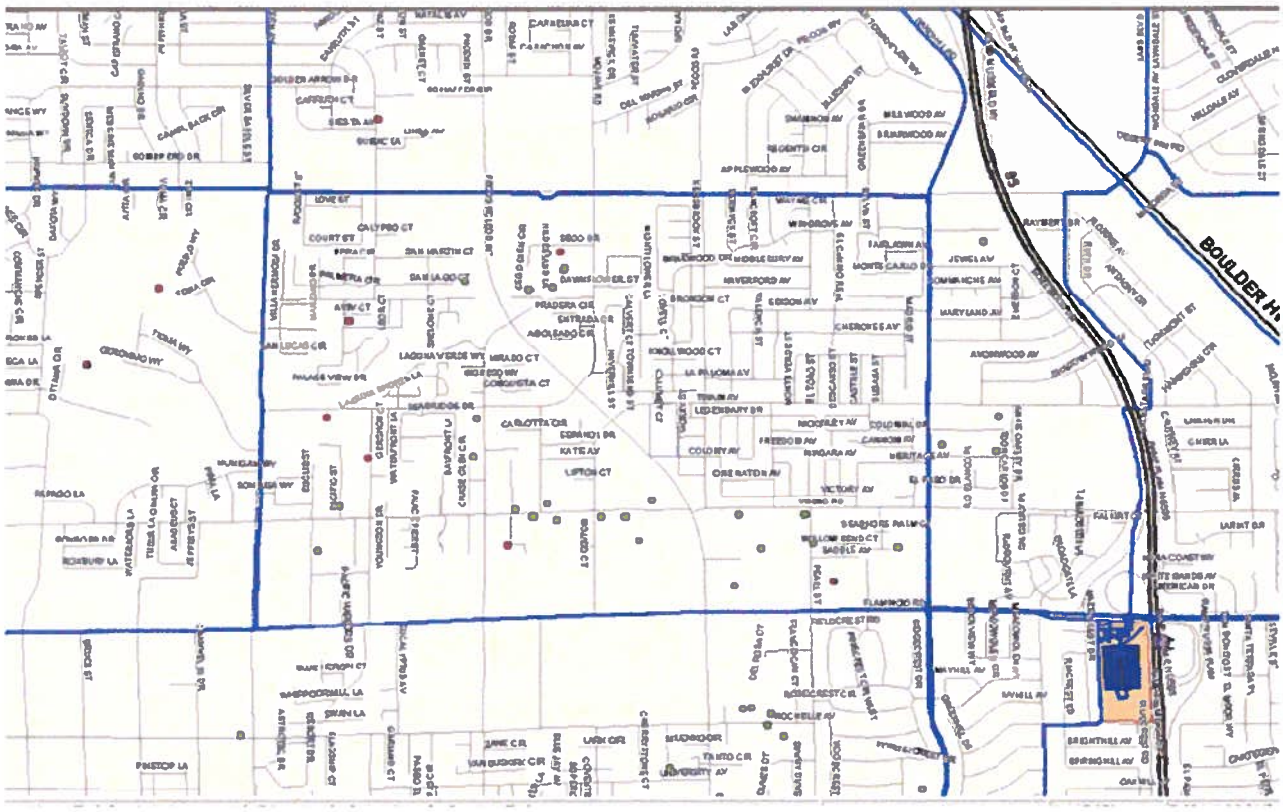


Figure 2. This map shows the approximate locations of wells originally in the NDWR database for this area. Not all the locations shown may still be active wells because, in Nevada, water rights may be sold separately from the property, and may then be relocated within the basin. Note that the irrigation wells on the golf course are listed as recreational wells in the NDWR database.



36. Page 6-1, Section 6.0. The schedule should be revised to include a project chart or table that indicates the number of weeks and completion targets anticipated for key milestones (e.g., start, duration and completion of field work, submittal of reports, etc.). This is needed as part of outreach efforts for residents and coordination of planning and resources for the NDEP.

PART B: CORRECTIONS AND SUGGESTED REVISIONS

37. Page 1-2, last paragraph. NDWR is the Nevada **Division** of Water Resources.

38. Page 1-3, second paragraph. Text states that "*The geology of the Site consists of interbedded **sequences** of sand, sandy silt, sandy clay, and silty clay with **frequent zones** of caliche and **intermixed** gravel **scattered throughout** (Figure 1-6). The depth to groundwater generally **varies** **between 9 and 28 feet** below ground surface (bgs) across the Site.*"

    "**Sequence**" has specific definitions in geology and is incorrectly used here; please restate as "*interbedded **layers and lenses** of sand, sandy silt...*". "**Frequent** zones of caliche" is incorrect; describe instead as "*scattered, discontinuous layers and lenses of caliche.*" And "**intermixed gravel scattered throughout**" does not properly convey the concept that there are "*deposits of gravely silty sand and scattered lenses of gravely sand and sandy gravel.*" This description of the geology suffers from some of the same problems as those noted in NDEP's comments on the second Draft CAP for Groundwater (February 28, 2011).

    The terms "vary" and "range" are not synonymous. Correct usage of these words would be "the depth to water ***ranges*** from 9 to 28 feet across the site, but ***varies*** annually within each well."

39. Page 3-1, third paragraph. The NDEP concurs with the plan to protect the privacy of individual homeowners.

40. Figure 3 -2. Please fade out the background photo on this and all other such maps, so that the posted information can be seen.

41. Figure 3-2. The golf course well PW-1 is incorrectly located on this figure. See NDEP's comment letters dated January 11, 2010 and February 3, 2011; both of which pointed out that the golf course irrigation well, PW-1, has been incorrectly located in Tetra Tech's reports for the site.

Other Notes:

- Vertical delineation of PCE in wells; this may be needed to evaluate the vertical variability in PCE concentrations in groundwater and compare this to the temporal variability in PCE concentrations in groundwater samples collected quarterly. Consider that irrigation on the golf course may be loading a layer of clean water atop the plume, such that the distribution of PCE may increase toward the bottom of wells MW-30 and MW-31.
- Quantitative passive samplers, have these been considered as part of the LTIAM program?
- Statistical testing for concentration trends in groundwater, use 80% confidence as "likely increasing" (evaluate effect of vertical variability in well and depth of sample collection from quarter to quarter
- The purpose of the air sampling is not only to trigger installation of SSD systems at the **interim-action level of 32 µg/m^3**, but to assure that PCE concentrations decline to the **remediation standard** for indoor air over the course of groundwater remediation. The Trust will need to address this latter aspect of the indoor air sampling program and how the selection of a remediation standard will affect the long-term indoor air monitoring program.

References

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McAlary, T. 2010. Think outside the Summa: Time-Weighted Average and Volume-Weighted Average Sampling to Manage Temporal and Spatial Variability in Vapor Intrusion Assessment Data. December.

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URS. 2007a. Off-Site Soil Vapor Assessment Report. April 13.

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